Seattle/King County

Contractors' Guide to Preventing Waste and Recycling · 2000

BUSINESS AND INDUSTRY RECYCLING VENTURE

King County Solid Waste Division

in cooperation with

Seattle Public Utilities

January 2000

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This material will be provided in alternate formats upon request.

The Contractors' Guide to Preventing Waste and Recycling

Introduction

This guidebook provides recycling and waste prevention how-to's for all builders, from handyman/remodelers to large commercial contractors, who want to save money. This guide should be used with the *"Seattle/King County Construction Recycling Directory 2000/2001,"* which lists recycling and reuse options for construction debris. Both King County and the City of Seattle provide free technical assistance on reducing, reusing and recycling construction wastes. Other resources are listed in this guide under *"Where to Get More Information."*

Questions?

- In **King County** call the King County Customer Service Representatives at 296-4466 or the King County Construction, Demolition and Landclearing (CDL) program at (206) 296-8480. You may also find answers to commonly asked questions on King County's website: **www.metrokc.gov/dnr/swd/**
- In **Seattle** call the Business and Industry Recycling Venture hotline at (206) 389-7304. You also may find this information on their website. Direct your browser to: **www.seattlechamber.com/birv/**

Table of Contents

CASE STUDY: Lozier Homes saved nearly $15,000 at Klahanie Development

Cutting the Scrap

Lozier architects worked carefully on product design to reduce scrap. Dimensions throughout the house were even multiples of two so plywood and dimensional lumber waste was minimized. Sheets of sub-floor were assigned a number and then laid out by sheet on the plans. Framers were given a list that showed how and where larger pieces were to be cut and where leftover pieces could be used. They used the same numbering system for beam stock and each beam was ordered to a length that produced the least amount of waste.

Shrinking the Footprint

Framing with 2x4's instead of 2x6's meant Lozier was able to decrease the footprint of the Klahanie houses without decreasing living space or quality. Each house was about 70 square feet smaller due to narrower exterior walls. With a 60-house project, that added up to savings of over 4,000 square feet – the equivalent of two houses worth of material.

Benefits/Cost Savings

$245 per house or 14,736 for total project
55% recycling rate

Tons recycled

2.2 tons per house (approximate)
132.7 tons for total project (approximate)

LOZIER HOMES

1203 114th Ave. SE
Bellevue, 98004
(425) 454-8690

Preventing Waste in the First Place

Waste prevention is even more beneficial than recycling. Why? Activities that prevent the production of waste, such as reusing building materials not only cuts garbage and recycling collection costs but also reduces materials expenses. Small changes to building practices and extra attention to detail can add up to significant savings for the builder and the environment.

Design To Prevent Waste

Paying attention to waste potential in the design stage can lead to less waste on the building site.

- ❑ Work with the client/designer to prevent waste by favoring designs that use materials efficiently.

Plan for Waste Prevention

Planning ahead and incorporating those plans into standard construction practices will ensure maximum waste prevention.

- ❑ Set waste prevention goals or target specific waste producing practices.
- ❑ Include waste prevention plans in a waste management plan. Refer to *"Designing Waste Management Plans"* for ideas.

Prevent Waste On-Site

Many on-site practices can make a difference in the amount of waste produced.

- ❑ Work with suppliers to reduce waste on a project. For example, ask suppliers to take back or buy back substandard, rejected, or unused items.
- ❑ Ask suppliers to deliver supplies using sturdy, returnable pallets and containers. Then have them pick up the empty containers when delivering new supplies.
- ❑ Assess whether storage and handling practices prevent loss from weather and other damage.

Purchase to Prevent Waste

Purchasing decisions have a major impact on the amount of waste generated on a construction project.

- ❑ Purchase good-quality, previously used items such as cabinets, doors, and equipment. (Don't assume your customer will resist using a reclaimed product. Simply ask first.)
- ❑ Re-evaluate estimating procedures to make sure the correct amount of each material is delivered to the site.
- ❑ Choose products that come with miminal or no packaging.

Reuse and Salvage

By reusing items on-site, donating and/or selling salvageable items, you can cut waste and reduce supply costs. If you are using a demolition contractor, specify reuse and salvage in the contract.

- ❑ Before demolition, identify potentially reusable or salvageable items.
- ❑ Contact salvage companies and not-for-profits that accept donated building materials. Refer to the *"Seattle/King County Construction Recycling Directory 2000/2001"* for resources.
- ❑ Determine the savings and cost of reusing, donating, and/or selling the salvagable items.
- ❑ Plan which items you will salvage. Determine how they will be removed and whether you will reuse, donate, or sell the items.
- ❑ Inform the demolition crew of the salvage procedures and expectations. Careful removal of these items is the key to their marketability.

Select a Salvager

Before you call a salvage company, determine the types and amounts of materials you will have available. Then ask the following questions:

- ❑ What materials do they accept; in what volumes?
- ❑ Will they pick up the materials at the job-site or will you need to deliver them?
- ❑ Is there a charge for pick-up?
- ❑ Will they provide containers for large quantities? Are there charges for containers?
- ❑ What is their collection schedule? How long will the items have to be stored?
- ❑ Will they pay you for the items? Will they visit the site and place a bid?
- ❑ If the items are being donated to charity, can the company receive a tax deduction?

Other Reuse Options

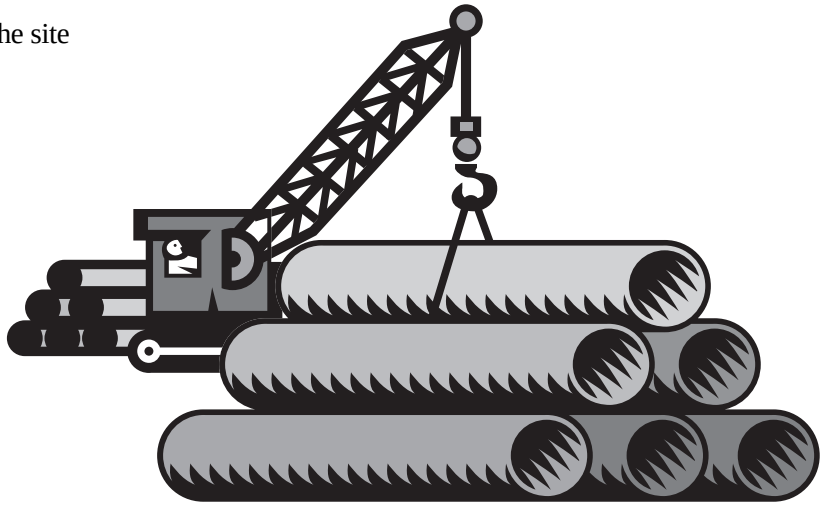
Many companies have had success with less formal reuse options. Consider the following ideas:

- ❑ Advertise reusable items in the newspaper.
- ❑ Conduct a "yard sale" on the job-site to sell reusable items.
- ❑ List the items in a materials exchange such as the Industrial Materials Exchange (IMEX).
- ❑ Allow workers to remove wood or other salvageable items for their own use.
- ❑ Set out "free wood" signs.
- ❑ Ask some subcontractors (such as electricians and pipe fitters) to reuse or recycle their own materials. Consider asking for or requiring documentation to verify reuse or recycling.

Reusable Building Materials

The following are just a few of the materials that can be salvaged, and donated or sold locally:

Appliances	Bathroom Fixtures
Bricks	Cabinets
Carpeting	Dimensional Lumber
Doors	Ductwork
Flooring	Insulation
Lighting Fixtures	Marble
Metal Framing	Paneling
Pipes	OSB &Plywood
Shelving	Siding
Tile	Trim
Windows	Wood Beams



Setting Up a Job-Site Recycling Program

Recycling construction materials helps save money by cutting disposal costs. It also reduces waste going to the landfill and attracts clients who value environmental responsibility. Other benefits include a cleaner, safer site and improved community relations. Follow these steps to set up a successful, cost-effective recycling program for your job-site.

Start Early

Incorporating recycling up front will ensure that opportunities are not missed and that the program is successful.

Analyze Project Waste

- ❑ Estimate the types and quantities of waste the project will generate.
- ❑ Determine when the project will generate each waste.
- ❑ Refer to *"Are There Dollars in Your Dumpster?"* for additional information.

Research Recycling Options

- ❑ Identify materials with the most recycling potential in the job-site area and investigate opportunities for recycling the more unusual wastes.
- ❑ Remember that chipping land clearing debris to use for mulch or erosion control, and grinding concrete and asphalt for fill are inexpensive, on-site recycling options.
- ❑ Decide whether to self-haul recyclables to the recycling facility or to contract with a recycling hauler. A combination of methods might be the best option.

Determine the Savings

- ❑ Compare the cost of normal construction waste disposal practices with the cost of recycling to determine if recycling is feasible.
- ❑ Refer to *"Are There Dollars in Your Dumpster?"* for help.
- ❑ Track your savings. This will help determine the cost-effectiveness of recycling on future projects.

Select the Recyclers

Once recycling is determined to be cost-effective, it is time to select the best recycling service for the job-site. Ask the recyclers the following questions:

- ❑ What materials do they accept?
- ❑ What are the specific guidelines for each material? For example, do they accept forming plywood in "clean wood"?
- ❑ If you are planning to self-haul, do they accept materials that are dropped off? What are the tipping fees?
- ❑ What are the charges for pick-up services including container rental, hauling, and tipping fees?
- ❑ What types of containers do they offer for pick-up service?
- ❑ What are the collection options? Do you need to call for service or do they monitor the bins?
- ❑ Will they help set up the program and provide training for the crew?

Develop a Waste Plan

Incorporate recycling as a standard construction practice to help everyone involved understand and implement recycling procedures.

- ❑ Decide what materials will be recycled on the project and determine which wastes subcontractors will be responsible for recycling.
- ❑ Designate someone to be responsible for implementing and monitoring a waste disposal and recycling program.
- ❑ Include requirements for on-site recycling in all project documents and subcontracts.
- ❑ Refer to "*Designing Waste Management Plans*" for help.

Set Up the Site

Work with your recycler and crew to determine the most effective way to set up the site for maximum recycling. Some suggestions include the following:

- ❑ Clearly designate the recycling bins. Post lists of what is and what is not recyclable.
- ❑ Place garbage and recycling bins near each other, and close to the point of waste generation but out of the traffic pattern.
- ❑ Consider locking the recycling bins or locating them in a locked area to prevent contamination.

Monitor the Program

An effective recycling program includes occasional monitoring.

- ❑ Check bins regularly for contamination.
- ❑ Periodically check the wastes in the garbage dumpsters to see if recyclables are being thrown away or if there are additional materials that could be recycled.
- ❑ Call the recycler ***before*** bins are full to arrange for pick up.

Promotion and Education

It is important to educate everyone on the job-site about the waste management program.

- ❑ Discuss waste handling requirements with crew and subcontractors prior to beginning a project.
- ❑ Post easy to read signs and provide written information about the recycling program.
- ❑ Continue education as the project progresses. Consider making recycling updates part of your safety program.

Designing Waste Management Plans and Specifications

Why specify waste management plans? Most successful construction projects outline the requirements of the project up front so that all members of the building team understand what is expected of them. This process is also important in implementing successful waste prevention and recycling programs. Additionally, some owners and designers now require waste management plans.

Waste Management Plans

Though a waste management plan does not need to be lengthy or complicated to be effective, all successful plans include the following information. Use the sample waste management plan on the next page as a guideline.

- ❑ **Waste management goals:** First, make an overall commitment to waste prevention and recycling. Then, provide a quantitative goal such as "Reuse or recycle 50% of project wastes."
- ❑ **Analysis of the project waste:** Determine what wastes the project will create. Refer to *"Are there Dollars in your Dumpster?"* for help. Don't forget to include reusable and salvageable materials.
- ❑ **Disposal methods:** Indicate in this section whether each material will be reused, salvaged, recycled, or disposed of as garbage.
- ❑ **Material handling procedures:** Describe how the materials are to be removed, separated, and stored or transported for reuse, salvage, recycling, or disposed as garbage.
- ❑ **Education and promotion:** How will the plan be communicated to the crew and subcontractors? What methods will be used to ensure that the plan is effective?

Specifications

In addition to a general waste management plan, it is important for large projects to specify the waste management goals in subcontractors agreements. This assures that the expectations and procedures are communicated clearly to everyone. The sample specification on the next page is a useful model.

Sample Specification for Subcontractor Agreement

The subcontractor will make a good faith effort to reduce the amount of waste generated on the job-site and recycle materials per the contractor's Waste Management Plan. The subcontractor will follow handling requirements for each material listed in the Waste Management Plan.

Sample Waste Management Plan

Northwest Best Construction Waste Management Plan
Northwest Bank Building, Kent, WA
Demolition/new construction
Recycling Coordinator: John Doe

I. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials, and reusing materials wherever possible. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be salvaged for donation or resale, or separated for recycling.

II. The following chart identifies the waste materials that will be generated on this project, the disposal method for each material, and any handling procedures.

III. Waste prevention and recycling activities will be discussed at the beginning of each safety meeting. As each new subcontractor comes on-site, the recycling coordinator will present him/her with a copy of the Waste Management Plan and provide a tour of the recycling areas. The subcontractor will be expected to make sure all the crew comply with the Waste Management Plan. All recycling containers will be clearly labeled and lists of acceptable/unacceptable materials will be posted throughout the site.

Sample Waste Management Plan

Material	Qty.	Disposal Method	Handling Procedure
Demolition			
Asphalt from parking lot	100 tons	Ground on-site, reused as fill.	
Wood framing	6 tons	Recycled - Wood Recycling NW.	Separate clean wood in “clean wood” dumpster.
Decorative wood beams	300 bd. ft.	Salvaged - Timber Frame Salvaging.	Remove by hand, store on-site, on pallets for pick up.
Remaining wastes *(painted wood, broken glass, misc.)*	8 tons	Garbage - Sound Disposal.	Dispose of in “trash” dumpster.
New Construction			
Concrete	2 tons	Recycled - Puget Sound Concrete.	Break up any wastes or mistakes and put in “concrete” dumpster. Rebar OK.
Forming boards		Reused as many times as possible then recycled - Wood Recycling NW.	Stack next to supply of new form boards for reuse. Recycle clean unusable forms in “clean wood” recycling dumpster.
Clean wood scrap	12 tons	Scraps reused for form work, fire-breaks, etc. Then recycled - Wood Recycling NW.	Stack reusable pieces next to dumpster for reuse. Separate unusable clean wood into “clean wood” recycling dumpster.
Scrap metal	5 tons	Recycled - Seattle Metals.	Deposit all metals in “metal” dumpster.
Drywall	10 tons	Subcontractor will recycle and submit reports to recycling coordinator.	Either provide container or collect in vehicle for recycling.
Electrical/Plumbing subcontractors’ metal and other recyclables		Subcontractors will recycle and submit reports to recycling coordinator.	Either provide container or collect in vehicle for recycling.
All other wastes	14 tons	Garbage - Sound Disposal.	Dispose of in “trash” dumpster.

Making Your Program Work

Lessons Learned by Local Contractors

The small effort needed to prevent waste and recycle on a job-site usually pays off in disposal and supply cost savings. One local builder said that recycling was so much a part of his building practices that it would cost him money not to recycle! However, even the best programs encounter difficulties. Here are solutions to some of the challenges faced when developing and implementing a waste management plan. These suggestions have been successfully used by builders across the country.

Managing Your Program

What is a cost-effective way to manage a successful waste management program?

- ❑ Designate a person to manage the details of creating and implementing the program. On residential projects, this might be the contractor, site supervisor, or crew chief.
- ❑ For larger projects, form a waste management team consisting of key people like the owner, designer, project managers, and site supervisor. This will ensure that the program is designed to provide opportunities for everyone to participate.

Involving the Subcontractors

What is the best way to handle the wastes subcontractors generate?

- ❑ Require subcontractors to use the recycling and disposal bins on-site. This allows the most control of recycling activities. Be sure to provide recycling for the variety of wastes the subs generate.
- ❑ Alternatively, ask the subcontractors to recycle their own waste, but require written reports. Since many subcontractors' wastes are homogeneous, it is easy to separate the wastes for recycling.
- ❑ Use a combination of methods, depending on the type and quantity of wastes the subs generate. Obtain reports on all outside recycling.

Finding Appropriate Space

How can I find space to separate recyclables on space-constrained sites?

- ❑ Choose smaller bins and more frequent collection. There are a variety of container sizes and service options available through recycling service providers.

- ❑ Use scrap lumber to divide one dumpster into separate compartments for storing recyclables and trash on-site instead of having multiple dumpsters.
- ❑ Ask recycling service providers about single dumpsters with multiple compartments.
- ❑ Rent a trailer for the major recyclable material generated in the first phase of construction. When full, haul it directly to the recycler. Bring it back to collect the next material generated.
- ❑ Use smaller containers that are collected at the end of the day and dumped into a larger container for pick up.
- ❑ If self-hauling, build custom containers to fit the space requirements using scrap or damaged plywood, concrete forms, or barrier fencing.
- ❑ Use trash cans and other small containers to collect recyclables generated in smaller amounts.

Promotion and Education

How do I educate my crew and subcontractors? How do I ensure their participation?

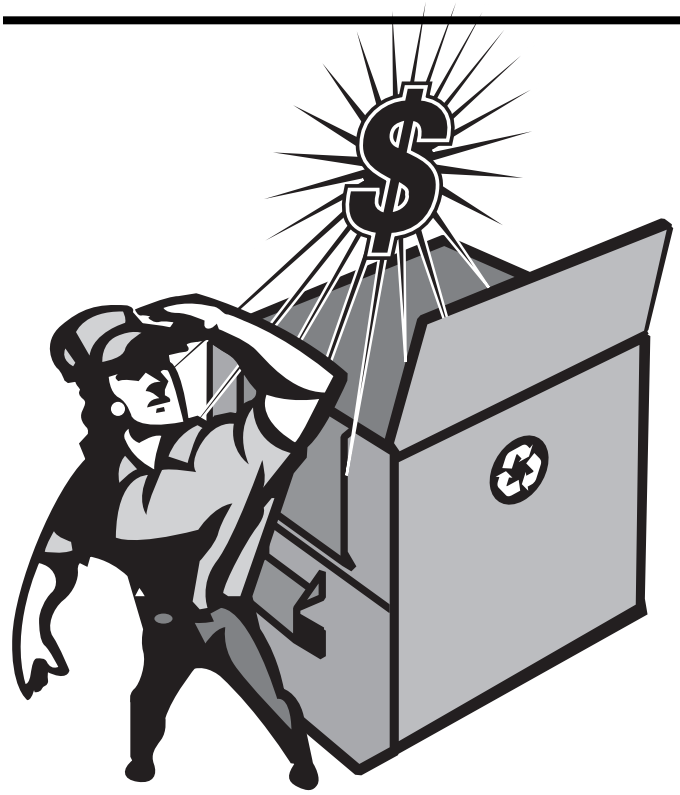
- ❑ Include waste handling requirements in all project documents. This makes it clear from the beginning that waste prevention and recycling is expected from all crew members and subcontractors.
- ❑ Treat waste management like a safety program. Integrate recycling training into the safety education, or design a separate recycling education program.
- ❑ Create a name or slogan for the program to be used in education and promotion. Inexpensive rewards such as hats, T-shirts, or decals can provide incentives to make the plan work.
- ❑ Share the success. Let subcontractors and crew know how effective they have been by regularly posting the volumes of materials reused or recycled.
- ❑ Be positive! When the crew and subcontractors are motivated and understand the goals, they will figure out creative ways to overcome obstacles and work efficiently.
- ❑ Include everyone in the process. Encourage suggestions on more efficient methods, or additional materials that can be recycled.

Preventing Contamination

How can I prevent contamination of recyclables?

- ❑ Laminate a poster with pictures describing the recycling program and post it in visible locations.
- ❑ Clearly designate the recycling bins. Post lists of what is and what is not recyclable.
- ❑ Place recycling and trash bins near each other so trash is not thrown in the recycling bin.
- ❑ Provide enough trash bins to collect unrecyclable items. Have them emptied regularly so the overflow does not end up in the recycling bin.
- ❑ Consider locating bins in a locked or supervised area to prevent contamination by the public.
- ❑ Conduct regular site visits to verify that bins are not contaminated. Provide reports and educate subcontractors and crew on the results.
- ❑ Dump out contaminated loads and have the subcontractors and/or crew pull out the contaminants themselves. It takes some time, but contamination probably won't happen again.

Are There Dollars In Your Dumpster?



How to Calculate the Cost-effectiveness of Job-site Recycling

Construction companies pay to dispose of the wastes generated on a job-site. By recycling job-site materials instead, contractors can reduce their overall disposal costs. Recycling opportunities for construction materials like asphalt, concrete, drywall, and wood have improved dramatically, resulting in lower tipping fees at recycling facilities compared to waste disposal facilities. ***Use the following instructions and worksheets to determine the cost-effectiveness of recycling on a given construction project. The words in parenthesis indicate information to be filled out on the worksheets.***

Analyze Project Waste

- ❑ Based on the type and size of the construction project, estimate the types of materials the project will generate. Enter this information on the *"Project Waste Analysis"* chart on page 17 *(Material)*. The following sources of information are helpful in estimating the project waste stream.
  - · Engineering estimates
  - · Previous material purchasing records
  - · Waste disposal records for similar projects
- ❑ If unable to predict the project's waste stream, use the following table as a guideline.

Typical Waste from Construction

Material	Percentage of total waste: Residential	Commercial
Wood	25%	18%
Cardboard	10%	7.5%
Concrete/Asphalt	4.5%	15%
Metal	1%	4.5%

Source: *Construction Materials Recycling Guidebook, 1993. Twin Cities, MN*

- ❑ Don't forget to include wastes from demolition phases of the project.
- ❑ Estimate the quantity of each material the project will generate in cubic yards or tons *(Quantity)*. Some recyclers charge by the cubic yard, some by the ton. Chose the measurement that will work best for your project. Use the following volume to weight conversion chart to convert all numbers to a consistent unit of measurement. The actual conversions for construction wastes are highly variable.

Weight to Volume Conversion Chart

Material	Volume	Weight
Wood	.15 tons/yd^3	6.7 yd^3/ton
Cardboard	.05 tons/yd^3	20 yd^3/ton
Drywall	.25 tons/yd^3	4 yd^3/ton
Concrete/Asphalt	.7 tons/yd^3	1.4 yd^3/ton

Source: *Resource Efficient Building, 1993. Earth-Wise Builders, Portland, OR.*

- ❑ Keep the receipts from recycling and garbage disposal to more accurately estimate the quantities generated on future projects.

Identify Recyclables

- ❑ Refer to the *"Seattle/King County Construction Recycling Directory 2000/2001"* to determine what materials might be recyclable or reuseable on this project. Fill out this information on the *"Project Waste Analysis"* chart *(Recyclable?/Reuseable?)*.
- ❑ Remember to include the more unusual recyclable materials such as plastic, ceiling tiles, paint, asphalt roofing, and carpet padding as well as commonly recycled materials like wood, metals, concrete, and cardboard.
- ❑ Consider options other than recycling, such as reusing materials on-site and salvaging for resale or donation. See *"Preventing Waste in the First Place"* for ideas.

Choose a Recycling Method

There are four methods for the collection and delivery of materials to recycling facilities.

- **Commercial haulers**: This option involves contracting with one or more garbage or recycling service providers to place collection containers on-site and haul the full containers to recycling facilities. This strategy works well on projects where large quantities of materials are generated, such as demolition, multifamily, and commercial projects. Some recyclers offer smaller dumpsters or dumpsters with several compartments for home construction and tenant improvement projects.
- **Self-hauling:** For residential construction and remodeling, this is often the recycling method of choice. Recyclable materials are collected on-site in piles or temporary containers and taken to recycling facilities in the contractor's own vehicles. This method is also effective for materials generated in small quantities.
- **Clean-up services:** A construction clean-up service that includes recycling offers garbage and recycling services all in one. The clean-up crew comes on-site and picks up recyclables and garbage that are collected in piles or containers. The materials are then taken to the most appropriate recycling or disposal facility. Several services offer job-site recycling consultations as well.
- **Commingled recycling:** Available in limited areas, commingled recycling programs collect containers of mixed recyclables or mixed garbage and recyclables, and separate them at the waste handling facility. This option is convenient for cramped sites, but the cost savings is limited and recycling rates may be lower than other options.

- ❑ Use the resources listed in the *"Where to Get More Information"* section to determine what services each recycling facility offers. Then, note the most appropriate method(s) for recycling each material on the *"Project Waste Analysis"* chart *(Possible Recycling Method)*.

Determine the Savings

Once you determine which materials are potentially recyclable and which methods to use for recycling, it is time to determine the savings or cost of recycling.

- ❑ To calculate the cost-effectiveness of recycling materials through a commercial recycler, and/or self-hauling materials to recycling facilities, follow the instructions in the *"Commercial Hauler"* and *"Self-Hauling"* sections and fill out the *"Recycling Economics Worksheets."* If both methods will be used to recycle materials from the job-site, combine the results from both worksheets to determine the overall savings or cost of recycling on the project.
- ❑ To calculate the cost of clean-up services, call a service, provide them with the analysis of the project's waste, and ask for an estimate.
- ❑ If available, obtain estimates of the cost of comingled collection from the hauler using the estimated total quantity of wastes for the project.

Commercial Collection

Use this section for calculating the savings or cost of recycling materials through a commercial hauler.

- ❑ From the *"Project Waste Analysis"* chart, fill in the materials that will be recycled through commercial hauler and the estimated tons or cubic yards of each on the *"Recycling Economics Worksheet – Commercial Hauler" (Material).*
- ❑ Determine what size containers will be needed based on the space available on site. Use the proposed container size and the estimated volume of each waste material to calculate the number of loads of recycling the project will generate, e.g. 100 cu. yds. drywall / 40 cu.yd. container = 3 loads (2.5 rounded up) *(No. of Loads).*
- ❑ Based on the construction flow chart, estimate the number of months that recycling containers will be needed for each material *(No. of Months).* Cardboard, for example, is generated throughout a project while drywall waste often does not appear until interior finishing begins.
- ❑ Collect the following information from local commercial recyclers and garbage companies. Add this information to the worksheet.
  - · The tipping fee in tons or cubic yards for each material *(Tipping Fee).*
  - · The hauling fee to the recycling/garbagefacility *(Hauling Fee).*
  - · The monthly rental for the chosen container *(Rental).*
- ❑ Use the above information to calculate the cost of recycling *(Total Cost).*
- ❑ Calculate what it would cost to dispose of the materials as garbage instead of recycling them *(Cost of Not Recycling).* Use the total number of tons or cubic yards and current garbage costs.
- ❑ Determine the savings or cost of recycling by subtracting the cost of recycling from the cost of not recycling *(Savings or Cost of Recycling).*
- ❑ Consider the additional costs or benefits involved in job-site recycling including labor costs and the potential marketing benefit. Adjust the savings or cost of recycling accordingly.
  - · **Labor Costs:** Some additional labor costs may occur from job-site recycling, especially on the first few projects. Many contractors have found, however, that once the crew adjusts to the changes in disposal practices, recycling takes little to no additional time.
  - · **Marketing Value:** Many contractors have recognized that instituting environmental building practices, like waste prevention and recycling, can help attract additional clients and build a positive public image.

Self -Hauling

Use this section for calculating the savings or cost of self-hauling materials to the recycling facility.

- ❑ From the *"Project Waste Analysis"* chart, fill in the materials that will be self-hauled to the recyclers and the estimated tons or cubic yards of each on the *"Recycling Economics Worksheet – Self-Hauling" (Material).*
- ❑ Divide the estimated quantity of each recyclable by the per load capacity of the vehicle used to haul the recyclables to determine how many trips to the recycling facility will be necessary *(No. of Loads).*
- ❑ Collect the following information from the facilities where the recyclables will be delivered. Add this information to the worksheet.
  - · The tipping fee in tons or cubic yards for each material *(Tipping Fee).*
  - · The distance of the drop-off site from the project in travel time *(Hours per Load).*
- ❑ Fill in the hourly labor rate for hauling recyclables to the drop-sites. If desired, include any estimated costs for the vehicle, such as gasoline *(Labor Rate and/or Truck Costs per Hour).*
- ❑ Use the above information to calculate the cost of recycling on the worksheet *(Total Cost).*
- ❑ Calculate what it would cost to dispose of the materials as garbage instead of recycling them *(Cost of Not Recycling).* Use the total number of tons or cubic yards and current garbage costs.
- ❑ Determine the savings or cost of recycling by subtracting the cost of recycling from the cost of not recycling *(Savings or Cost of Recycling).*
- ❑ Consider the additional costs or benefits involved in job-site recycling including labor costs and the potential marketing benefit. Adjust the savings or cost of recycling accordingly.
  - · **Labor Costs:** When self-hauling, some additional labor costs may be incurred from processing the materials for recycling, such as labor for building containers or loading the truck.
  - · **Marketing Value:** Many residential contractors and remodelers have discovered that their customers are increasingly concerned about the environment. Builders who practice waste prevention and recycling are in the best position to attract those clients.

Decide to Recycle

- ❑ Based on the results obtained from the worksheets and your own waste management goals, decide which materials to recycle. It may be most cost-effective to only recycle one or two of the wastes generated by the project, or it might be worth-while to institute a full-fledged recycling program.
- ❑ Refer to *"Setting Up a Job-Site Recycling Program"* for information and assistance getting started.
- ❑ Plan for future projects. Although job-site recycling is gaining popularity as a waste handling option, recycling might not be cost-effective on all sites. Consider making a policy of recycling on all sites where it saves money, or incurs no additional costs.

Sample Project Waste Analysis

Project consisted of demolition of two small buildings, one small brick and wood framed store and one larger concrete tilt up building and new construction of 40,000 square foot concrete building with wood framed interior.

Material	Quantity	Recyclable? Reusable?	Possible Recycling Method
Demolition			
Salvageable timbers	2500 bd.ft.	Salvageable	Sell to timber broker
Clean wood	1 ton	Recyclable	Commercial hauler
Demolition wood (painted, stained)	5 tons	No	
Concrete	200 tons	Recyclable	Commercial hauler
Asphalt	minimal	Not in this quantity	
Ferrous metals (rebar, steel framing)	6 tons	Recyclable	Self haul
Copper and other metals	1 ton	Recyclable	Self haul
Carpet (good condition)	10,000 sq.ft.	Reusable	Remove for salvager
Carpet padding	10,000 sq.ft.	Recyclable	Self haul
Fluorescent light fixtures and bulbs	75	Reusable	Call salvager
Painted drywall	12 tons	No	
Brick	12 cubic yards	Reusable	Call salvager
Other misc. debris	20 tons	No	
New Construction			
Land clearing (brush, stumps)	20 cubic yards	Reusable on site	Call mobile chipper
Rock/fill dirt	40 cubic yards	Recyclable	Commercial hauler
Concrete	.5 tons	Recyclable	Commercial hauler
Clean wood	22 tons	Recyclable	Commercial hauler
Drywall	12 tons	Recyclable	Commercial hauler
Misc. metals	2 tons	Recyclable	Self haul
Asphalt roofing (asbestos-free)	2.75 tons	Recyclable	Commercial hauler
Cardboard	1 ton	Recyclable	Commercial hauler
Paint	5 or 6 cans	Reusable on site	List in IMEX
Paper, cans, and glass from trailer	1 cu.yd./mth	Recyclable	Commercial hauler

Project Waste Analysis Worksheet

Material	Quantity	Recyclable? Reusable?	Possible Recycling Method

Recycling Economics Sample

Commercial Hauler

Project was new construction of a 40,000 sq.ft. concrete tilt up retail store in south King County.

Cost of Recycling

Material	Tons or yards³	Tip fee	Subtotal 1 (tons or yds³ x fee)	No. of Loads	Hauling Fee	Subtotal 2 (loads x haul fee)	No. of Months	Cont'r Rental	Subtotal 3 (months x rental)	Total Cost (Subtotal 1+2+3)
Asphalt *(recycled on site)*	600	$0.00	$0.00		$0.00	$0.00			$0.00	$0.00
Wood	24	$25.00	$600.00	12	$37.50	$450.00	3	$30.00	$90.00	$1,140.00
Cardboard	3	($39.00)	($117.00)	1	$37.50	$37.50	4	$30.00	$120.00	$40.50
Drywall	14	$45.00	$630.00	2	$50.00	$100.00	2	$30.00	$60.00	$790.00
										$ .00
										$ .00
										$ .00
										$ .00
										$ .00
Totals	641		$1,113.00			$587.50			$270.00	**$1,970.50**

Cost of Not Recycling

Material	Tons or yards³	Tip fee	Subtotal 1 (tons or yds³ x fee)	No. of Loads	Hauling Fee	Subtotal 2 (loads x haul fee)	No. of Months	Cont'r Rental	Subtotal 3 (months x rental)	Total Cost (Subtotal 1+2+3)
Garbage	641	$70.63	$2,895.83	6	$54.12	$324.72	6	$30.00	$180.00	**$3,400.55**

Savings or Cost of Recycling

$3,400.55 *(Total Cost of Not Recycling)*	–	**$1,970.50** *(Total Cost of Recycling)*	**= Savings of:**	**$1,430.05**

Recycling Economics Worksheet

Commercial Hauler

Cost of Recycling

Material	Tons or yards^3	Tip fee	Subtotal 1 (tons or yds^3 x fee)	No. of Loads	Hauling Fee	Subtotal 2 (loads x haul fee)	No. of Months	Cont'r Rental	Subtotal 3 (months x rental)	Total Cost (Subtotal 1+2+3)
Totals										

Cost of Not Recycling

Material	Tons or yards^3	Tip fee	Subtotal 1 (tons or yds^3 x fee)	No. of Loads	Hauling Fee	Subtotal 2 (loads x haul fee)	No. of Months	Cont'r Rental	Subtotal 3 (months x rental)	Total Cost (Subtotal 1+2+3)
Garbage										

Savings or Cost of Recycling

(Total Cost of Not Recycling) – (Total Cost of Recycling)	= **Savings of:**	

Recycling Economics Sample

Self-Hauling

Project was a second story addition to a single family home in the City of Seattle.

Cost of Recycling

Material	Tons or yards[3]	Tip fee	Subtotal 1 (tons or yds[3] x fee)	No. of loads	Hours per load	Labor rate and/or truck costs per hour	Subtotal 2 (loads x hours x cost)	Total Cost (Subtotal 1+2)
Wood	6.5	$45.00	$292.50	13		$25.00[1]	$325.00	$617.50
Asphalt Shingles	3.5	$50.00	$175.00	6		$25.00	$150.00	$325.00
Metal Oil Tank *(350lbs)*			$0.00					$105.00[2]
Copper/Aluminum/Steel[3]			$0.00					($10.40)
Drywall	4	$50.00	$200.00	8		$25.00	$200.00	$400.00
Concrete	0.2		$15.00[4]	1		$25.00	$25.00	$40.00
Totals								**$1,477.10**

[1] *$25.00 was the estimated cost of labor per load;* [2] *Cost to recycle this underground metal oil tank;* [3] *125 pounds;* [4] *$15.00 minimum charge at concrete recycle.*

Cost of Not Recycling

Material	Tons or yards[3]	Tip fee	Subtotal 1 (tons or yds[3] x fee)	Instead of self-hauling, would have rented a dumpster for disposal – 6 month rental wit h4 pickups: cost $700	Total Cost (Subtotal 1+2)
Garbage	14.2	$71.00	$1,008.20	$700.00	**$1,708.20**

Savings or Cost of Recycling

$1,708.20 *(Total Cost of Not Recycling)*	–	**$1,477.10** *(Total Cost of Recycling)*	**= Savings of:**	**$231.10**

Recycling Economics Worksheet

Self-Hauling

Cost of Recycling

Material	Tons or yards^3	Tip fee	Subtotal 1 (tons or yds^3 x fee)	No. of loads	Hours per load	Labor rate and/or truck costs per hour	Subtotal 2 (loads x hours x cost)	Total Cost (Subtotal 1+2)
Totals								

Cost of Not Recycling

Material	Tons or yards^3	Tip fee	Subtotal 1 (tons or yds^3 x fee)	No. of loads	Hours per load	Labor rate and/or truck costs per hour	Subtotal 2 (loads x hours x cost)	Total Cost (Subtotal 1+2)
Garbage	0							

Savings or Cost of Recycling

(Total Cost of Not Recycling) – (Total Cost of Recycling)	= **Savings of:**	

Using Recycled-content Building Materials

Recycled-content building materials are just like building materials made from virgin materials, and they help conserve our natural resources. Many common building products like Homasote paneling and blown-in cellulose insulation, both made from reclaimed newspapers, have contained recycled materials for years. New products utilizing recycled materials, such as carpet, concrete, and plastic lumber, are being developed every day.

Benefits of Buying Recycled

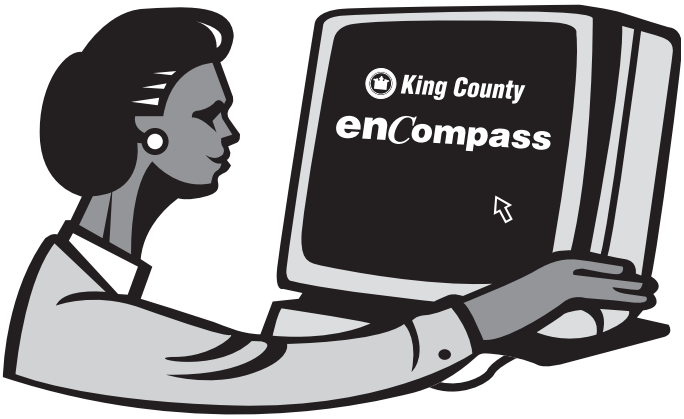
- **Quality:** Today's recycled-content building materials are competitive in price with high quality and durability. Many ICBO, ASTM, and UL certified materials are available.
- **Marketing benefits:** Growing consumer concern for the environment has made "going green" a marketing trend of the 1990's. Gain a competitive edge by joining other designers and builders who are promoting their experience with recycled building materials.
- **Resource efficiency:** Recycled-content building products can be manufactured using recycled construction wastes, offering a closed-loop recycling opportunity.

  These products create needed markets for recycled materials and also reduce the strain of consumption of scarce virgin resources by the construction industry.
- **Supports the local economy:** Many recycled-content building products are produced by Washington state manufacturers.

Postconsumer vs. Preconsumer

- **Postconsumer** recycled-content products contain materials that have been used by consumers, like a contractor, and collected for reprocessing.
- **Preconsumer** or postindustrial recycled-content products contain "waste" materials created as a by-product of manufacturing that are collected and reincorporated into the manufactured product.

Products with high postconsumer recycled content are more resource efficient. However, using a product with any recycled content is better than using products made entirely with virgin materials that consume more energy and natural resources.



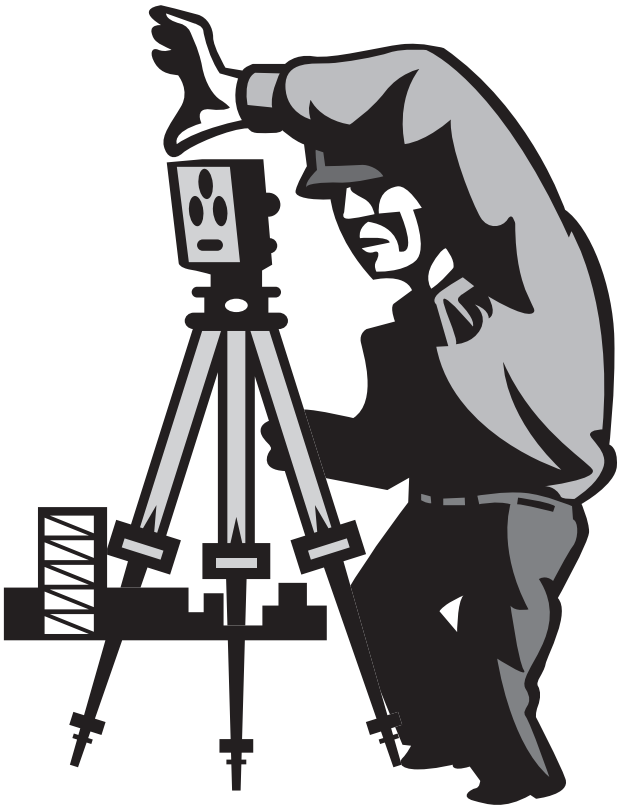
How to Buy Recycled

- ❑ Look for support. Other individuals on the project may be interested in trying recycled products.
- ❑ Obtain information on recycled products. Locally, there are several excellent free or low-cost resources available Refer to *"Where to Get More Information"* for help.
- ❑ Inform suppliers of your company's interest in using recycled-content products.
- ❑ Contact manufacturers for product specifications and samples.
- ❑ Prepare a short list of products to be utilized on a project. Remember to obtain written verification about each product's recycled-content from the manufacturer.
- ❑ Document your experience. By documenting product installations and taking field notes on how products perform, designers and builders can support one another and the markets for recycled-content products.
- ❑ Revise specifications, policies, and procedures to support purchasing recycled-content building materials.

Recycled-content Building Products

The following are just a few of the building products made with recycled materials:

Aluminum Windows	Asphalt
Base Coarse	Bathroom Partitions
Benches	Bike Racks
Building Blocks	Building Panels
Carpet/Carpet Pad	Ceiling Tiles
Cellulose Insulation	Compost
Concrete	Concrete Masonry Units
Copper Shingles	Counter Tops
Ductwork	Exterior Sheathing
Fences/Posts	Fiberboard
Fiberglass Insulation	Fill Material
Floor Joists	Floor Mats
Flooring	Glass Pavers
Glassphalt	Lumber
Metal Doors and Frames	Paint
Parking Stops	Pilings
Plastic Lumber	Plastic Shingles
Recycling Containers	Roofing
Structural Steel	Tile
Underlayment	Wallboard



Where to Get More Information

Technical Assistance

- **Projects in the City of Seattle** – call the Business and Industry Recycling Venture (BIRV) at (206) 389-7304. **www.seattlechamber.com/birv**
- **Projects in King County** – call the King County Construction, Demolition, and Landclearing (CDL) Program at (206) 296-8480. **www.metrokc.gov/dnr/swd/**
- **Other Washington State projects** – call the Washington State Department of Ecology at (360) 407-6300 for referrals. **www.wa.gov/swfa/cdl/cdlframe.html**
- **Northwest EcoBuilding Guild**, provides education on environmental building – call (206) 575-2222 or at their web site: **www.ecobuilding.org** .
- ***The Contractors' Guide to Preventing Waste and Recycling***, provides recycling and waste prevention how–to's for all builders – available through the BIRV or the King County CDL program *(listed above).*

Reuse and Recycling Resources

- ***Seattle/King County Construction Recycling Directory 2000***, lists recycling and reuse options for construction debris – available through the BIRV or King County CDL Program *(listed above).*
- **Business and Industry Recycling Venture (BIRV)**, maintains a database of reuse and recycling opportunities for over 100 different materials, including construction debris – call (206) 389-7304. **www.seattlechamber.com/birv**
- **King County Construction, Demolition, and Landclearing (CDL) Program** – call (206) 296-8480. **www.metrokc.gov/dnr/swd/**
- **Industrial Materials Exchange (IMEX)**, printed and Internet catalog of materials "wanted" and "available" for exchange in the Puget Sound area, includes construction materials – call (206) 296-4899. **www.metrokc.gov/hazwaste/imex**
- **1-800-RECYCLE, Washington State Department of Ecology**'s statewide recycling services information hotline – call 1-800-RECYCLE or visit their website at: **1800recycle.wa.gov**
- **Reusable Building Materials Exchange** – an interactive web page for exchanging all types of used or surplus building materials: **www.metrokc.gov/rbme** (see ad below).

Using Recycled-content Building Materials

- **King County Commission for Marketing Recyclable Materials**, information on public demonstration projects using recycled-content building materials – (206) 296-4439. **www.metrokc.gov/market**
- Also visit the Commission for Marketing Recyclable Materials web site **enCompass** at **www.metrokc.gov/market/encompass**. **enCompass** profiles buildings in the Puget Sound region built with recycled content construction materials.
- **Business and Industry Recycling Venture (BIRV)** – (206) 389-7304. **www.seattlechamber.com/birv**
- **King County** – call (206) 296-4210. **www.metrokc.gov**

enCompass